RM 10.9 Time Critical Removal Action - Resuspension Management

PREPARED FOR: NJDEP (File No. 0232-05-0001.2; Activity No. 13001 WFD)

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PROJECT NUMBER: 474468

The Lower Passaic River (LPR) Cooperating Parties Group (CPG) is planning to contain all dredging associated with the River Mile (RM) 10.9 Time Critical Removal Action (TCRA) within a silt curtain. The purpose of the silt curtain is to isolate and reduce flow so that resuspended sediment has time to settle before moving downstream. This approach meets the objective of NJDEP 7:13-11.15 (c) 3 *'In order to minimize the downstream transport of sediment during dredging, all areas being dredged are isolated from flowing water where possible….if channel flow is low, by blocking off sections of the channel being dredged and allowing the sediment to settle;'*

The NJDEP document "*The Management and Regulation of Dredging Activities and Dredged Material in New Jersey's Tidal Waters,*" October 1997, provides Best Management Practices (BMP) to minimize dredging impacts. It clearly states that "the Department has identified a number of BMPs which should be used to minimize the potential for, and magnitude of, adverse environmental impacts that could result from dredging operations." Many of the BMPs listed in the NJDEP document will be implemented during the RM 10.9 project and are listed at the end of this technical memorandum. One of the NJDEP BMPs is the use of silt curtains - "Silt curtains may be practical for use in areas where the water current is less than one (1) knot. The use of silt curtains may minimize the upper water column dispersal of sediments from the dredging area. This BMP can also be used to protect tidal creeks, interpier areas, United States Army Corps of Engineers (USACE)-recognized project management practice (USACE, 2005, 2008)

The RM 10.9 Removal Area conditions are favorable for minimal sediment resuspension and transport of the contaminants for the following reasons:

- The average river flow for the implementation months of July through October is anticipated to range from 500 to 800 cubic feet per second (cfs) (see Table 1), which is below the annual average flow rate of approximately 1,200 cfs. This lower flow range represents an average river velocity of approximately 1.5 ft/sec (0.45 m/sec or 0.87 knots). The highest river velocities under normal flow conditions are expected on the ebb tides at 1.64 ft/sec (0.5 m/s or 0.97 knots). Higher river velocities typically are found in the center ship channel whereas lower velocities typically prevail around near shore mud flats such as the RM 10.9 Removal Area. The existence of low flows in the dredge area reduces the potential transport of resuspended material from the dredge area and makes silt curtains an ideal resuspension control choice.
- Bathymetry of the Removal Area is relatively shallow with the entire area having an average water depth of less than 4 ft during typical tidal conditions. In addition, approximately one-third of the area is exposed at low tide resulting in some removal occurring "in the dry." Therefore, the site tidal conditions significantly reduce the water column heights through which resuspension occurs.

- Most of the in-place sediment consists of particles greater than 50 micrometers (µm) in size which will result in the settlement of resuspended sediment in close proximity to the dredging operations.
- No free product contamination has been found in the Removal Area, and the COPCs are hydrophobic; thus, the mechanism of contaminant release is sediment resuspension.

Based on the conditions listed above the use of silt curtains is appropriate and will be adequate to 'minimize the downstream sediment transport.'

TABLE 1
Historical Average River Flow Conditions (ft^3/Sec)

Year	2007	2008	2009	2010	2011	2012	6–Year Average	6-Year Maximum
July	662	333	908	328	505	300	506	1,720 (2009)
August	984	240	1,189	350	3,582	361	1,118[b]	23,800 (2011)[a]
September	165	653	464	177	6,029	323	1,302[b]	15,700 (2011)[a]
October	459	380	700	634	1,956	610	790	3,190 (2011)[a]

Source: United States Geological Survey (USGS) Water Resources Data for Passaic River at Dundee Dam at Clifton, NJ (#01389890) from 2007–2012.
[a] The maximum flow rate for years 2007-2012 excluding 2011 data (Hurricane Irene) are 2,580 cfm and 2,760 cfm for the months of August and September, respectively.
[b] Hurricane Irene made landfall August 28, 2011 resulting in higher than normal flow rates for the period August 28 to September 14, 2011. Excluding 2011 data, the 6 year average flows for August and September were 625 cubic feet per minute (cfm) and 356 cfm, respectively.

Silt Curtains

As there has been no free product identified within the sediment, and the RM 10.9 characterization did not identify any significant dissolved COPCs, resuspension of dissolved and colloidal phases of contaminants is unlikely. All removal activities will be conducted within a silt curtain/boom system to conservatively manage potential resuspension during dredging operations for the RM 10.9 Removal Action.

The selected silt curtain/boom system is designed specifically for silt control in rivers, intercoastal waterways, bays, and harbors and will be deployed as shown in the attached figures included in Attachment #1.

The perimeter of the silt curtain system will be marked by buoys. The silt curtain skirt will be long enough to direct resuspended sediment toward the bottom, and booms will be located sufficiently far from dredging activities that any potentially suspended materials will settle to the bottom before the current carries them beyond the boom.

Description

The silt curtain systems are designed to provide sufficient residence time to allow the larger sediment particles to settle out of suspension within the area being dredged. The silt curtain systems will be flexible and adaptable to both the environmental conditions of the river as well as all activities associated with dredging. These silt curtains will be constructed of PVC sheeting that is weighted on the bottom and suspended from marine-quality floatation buoys. Floating, flashing marker lights designed for use with turbidity control curtains will be installed.

Installation

The alignments of the silt curtain/boom systems will be established by Great Lakes Dredge and Dock (GLDD) who will determine the locations of all the anchors taking into consideration the capabilities of dredge plant and tidal fluctuations. The silt curtain/boom systems will be loaded onto work boats and transported to the designated area. Once on station, the silt curtain/booms will be lowered into the water and secured to the river bottom with anchors and/or tied off to the marine vessel(s). The silt curtain will be placed just above the sediment floor, avoiding contact with the bottom. After dredging an area, the silt curtains will be removed in the reverse order of installation prior to repositioning the dredge plant.

The dredging/capping contractor will utilize a single full silt curtain system to enclose the dredging/ capping operations. This single silt curtain system will be utilized for multiple deployments as the dredging/capping operations move through the Removal Area. Currently, three deployments are planned for the silt curtain system. These deployments include the "Finger Area", an area up river of the "Jersey City Municipal Utility Authority (JCMUA) No Dredge Zone" and the area down river of the "JCMUA No Dredge Zone".

A gate will be configured within the silt curtain system to allow the dredge barge, material barge and work boats to enter the dredge/ capping area inside the silt curtain system. The dredge and material barge will work within the silt curtain system where the site conditions allow such operations. However, in areas where there is insufficient room or tidal fluctuations do not allow the contractor to maneuver equipment efficiently, the material barge will be positions outside the single curtain system. When the material barge is located outside the main silt curtain system an additional silt curtain will be will be used to surround the material barge. The silt curtains will be specifically designed, manufactured by an external contractor specializing in environmental sediment control.

The silt curtains will have a drop which can be adjusted to prevent the silt curtain from dragging on the river bottom. Where the water elevations is less than -3 ft MLW only a floating boom will continue to the shoreline anchor in order to prevent the silt curtain fabric from dragging on the bottom. The silt curtain system will be secured in place using anchors initially spaced 50 feet apart and will be adjusted dependent on site specific conditions.

Typical details of the silt curtain system layout as well as details of the anchoring system and upper gate opening are provided as figures in Attachment 1.

Proposed Resuspension Control Approach (Best Management Practices)

Based on the existing river conditions and the relatively low estimated impact of dredging operations on the river, the Final Design Report for the RM 10.9 TCRA requires that the following BMPs be implemented to control turbidity:

- Deploy a heavy-duty silt curtain around the active dredging areas.
- Monitor the river velocity and suspend operations the velocity increases above the effective velocity of a silt curtain system (1.7 to 2.5 ft/sec) which based on historical data would only happen during a significant storm event on the order of 4,000 cfm or greater.
- Utilize a closed, watertight (i.e., environmental) clamshell.
- Maximize the size of the "bite" taken by the clamshell.
- Slowly withdrawing the clamshell through the very short water column.
- Prohibit barge overflow or rinsing sediment off the sides/gunwales of the barge.
- Maintain expeditious movement of the closed bucket to the receiving barge after completing a cut to reduce water leakage from the clamshell bucket into the river to the extent practicable.
- Prohibit "re-handling" or stockpiling of material on the river bottom.
- Prohibit raking for debris removal.
- Avoid grounding of marine vessels and allowing water levels to rise before attempting to free grounded vessels.
- Minimize the number of trips by support vessels.
- Restrict the draft of workboats and barges.

- Restrict navigational speeds.
- Restrict the size and power of workboats.
- Prohibit any type of prop-washing.

Furthermore, the success of these steps taken to control re-suspension will be constantly monitored via in river turbidity monitors as specified in the Water Quality Management Plan.

SUMMARY

The deployment of silt curtains to control sediment re-suspension from dredging operations is a USACE-recognized and NJDEP-sanctioned method to reduce downriver environmental impacts. The silt curtains to be deployed for the RM 10.9 TCRA are designed to be effective for the range of summertime flow conditions anticipated in the RM 10.9 section of the LPR and for the types of sediments that will be dredged. Finally, water quality monitors will be utilized to confirm the effectiveness of the deployed silt curtains and other BMPs in managing release of suspended sediment from the RM 10.9 area.

Attachment #1
Typical Silt Curtain Layout and Construction Details

Figure 1 – Silt Curtain System Layout (Barge Within)

Figure 2 – Silt Curtain System Layout (Barge Outside)

Figure 3 – Silt Curtain Anchoring Layout (Barge Outside)

Figure 4 – Typical Silt Curtain System Cross-Section

Figure 5 – Silt Curtain Gate Details

Figure 6 – Type II Silt Curtain Details

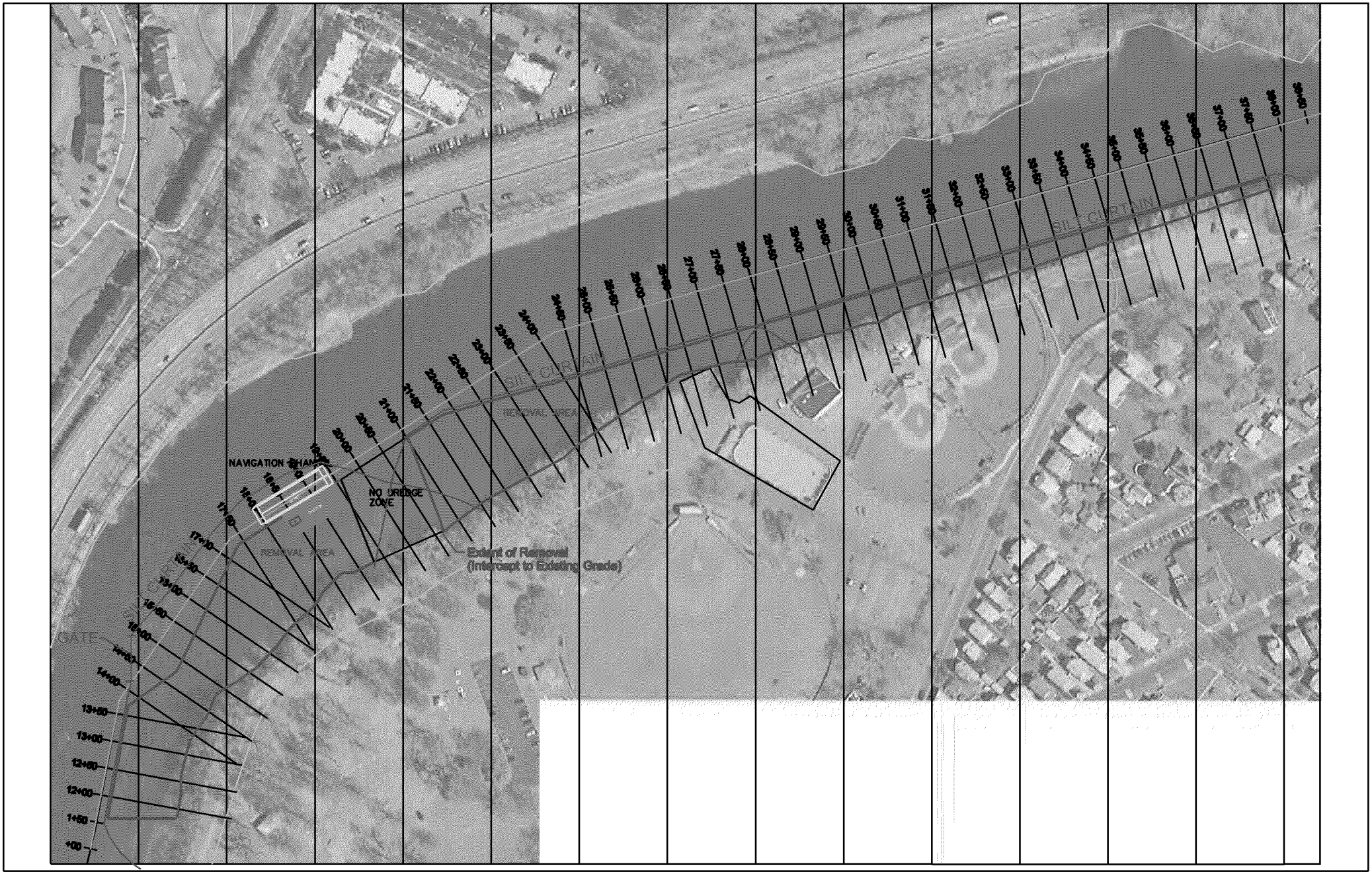


Figure 1 - Silt Curtain System Layout (Barge Within)

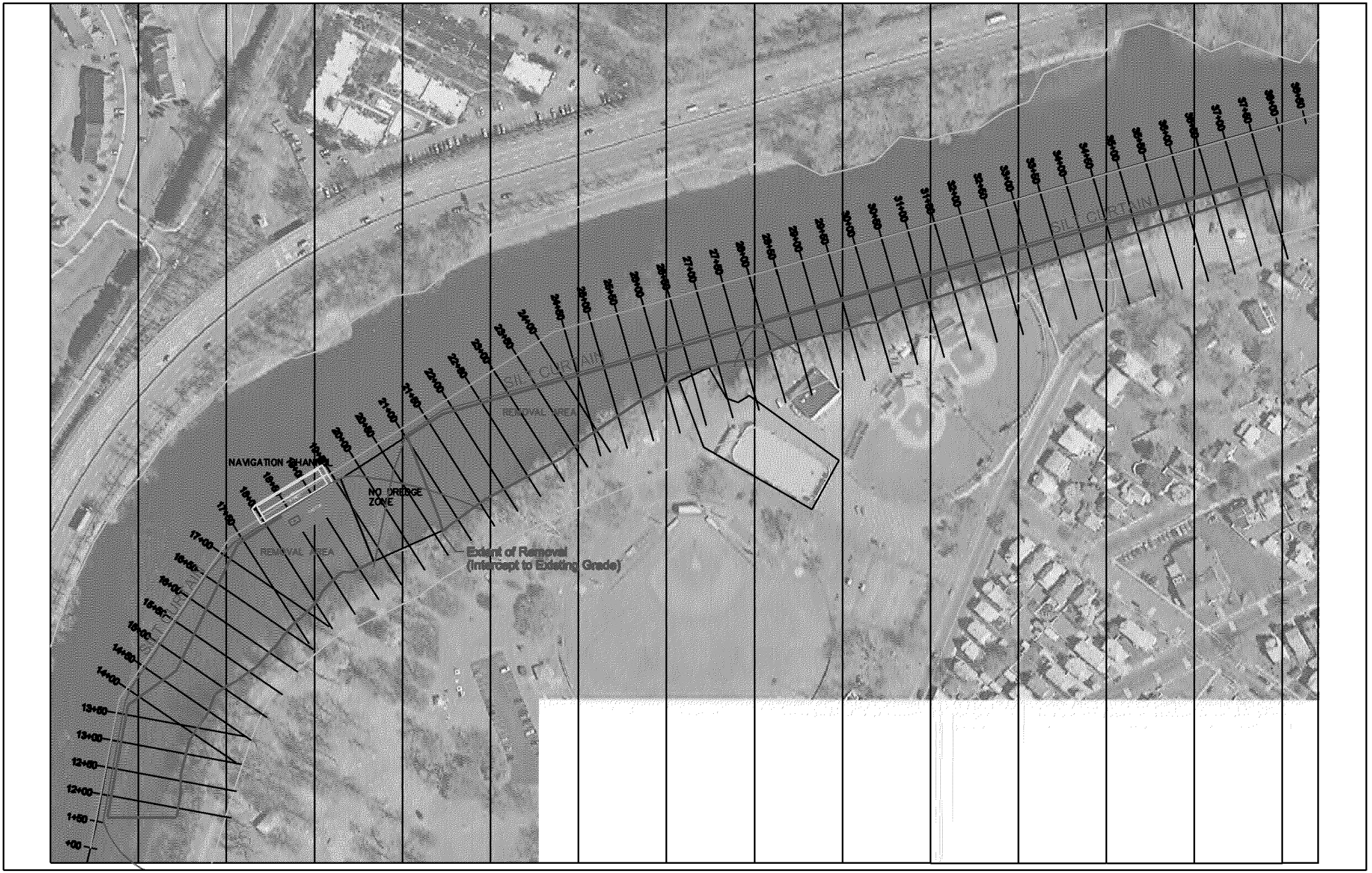


Figure 2 - Silt Curtain Layout (Barge Outside)

PROPOSED DREDGE LAYOUT

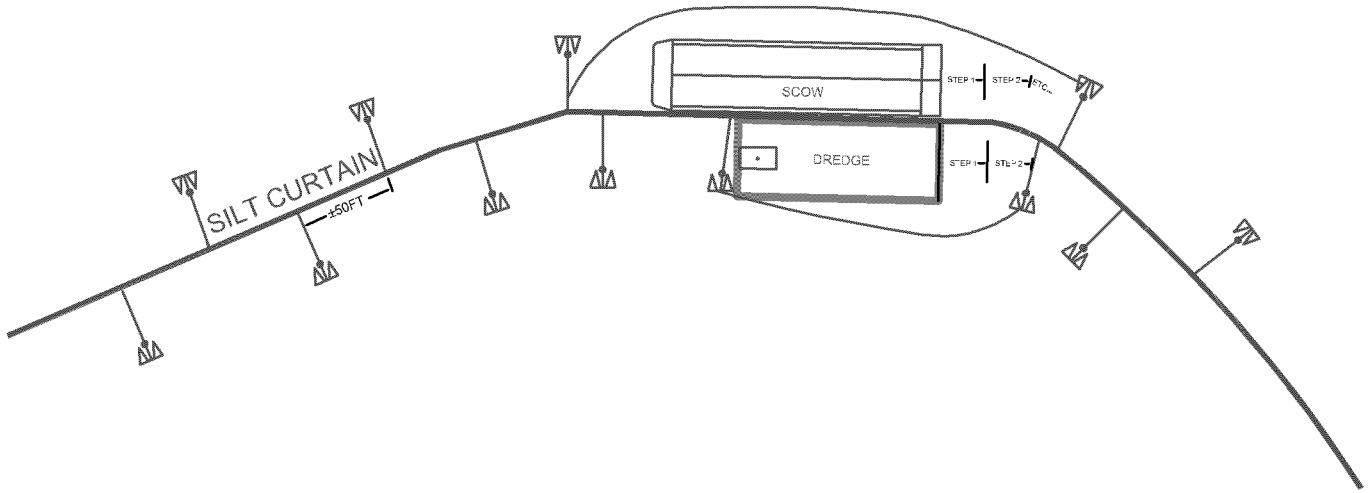
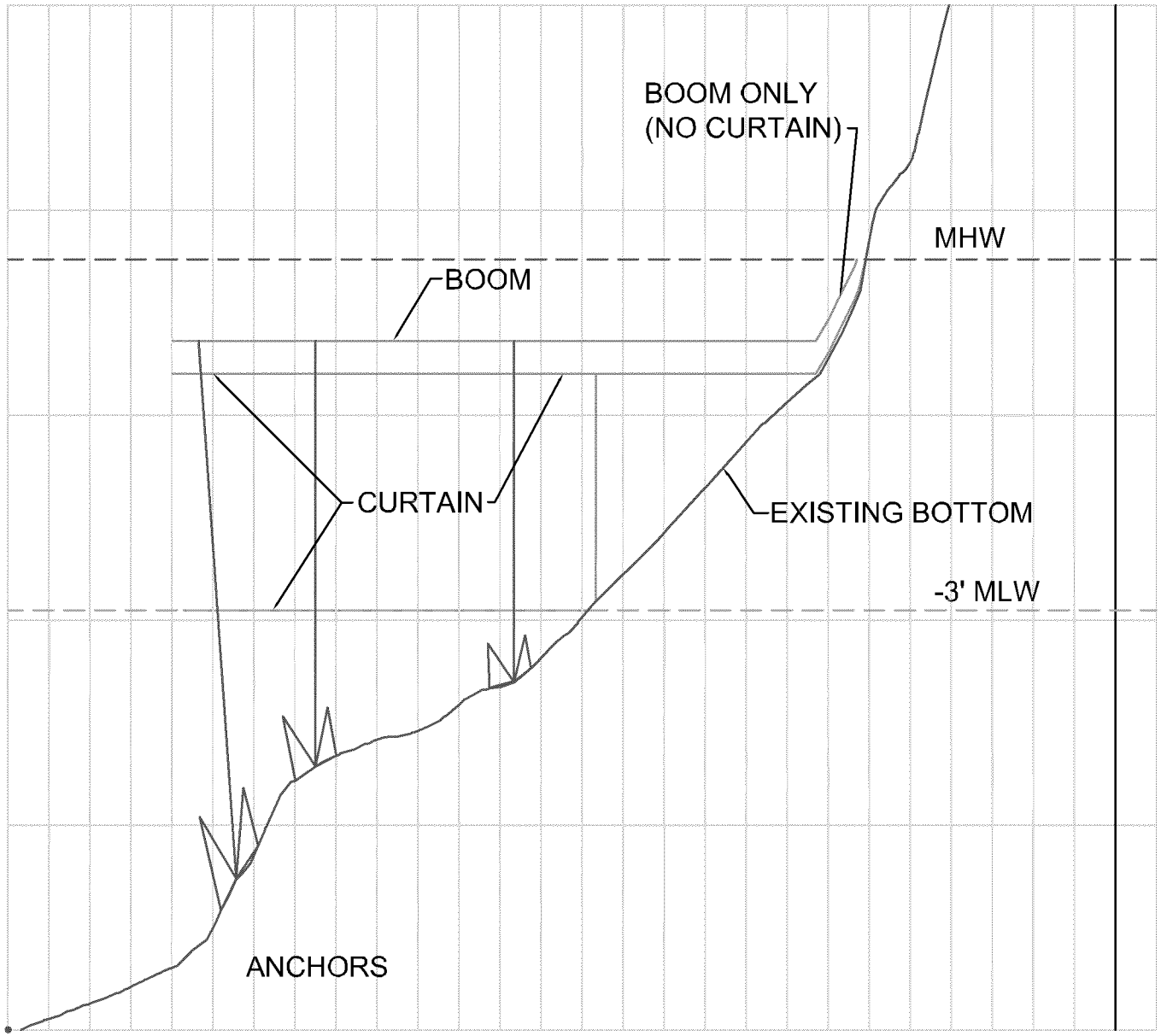


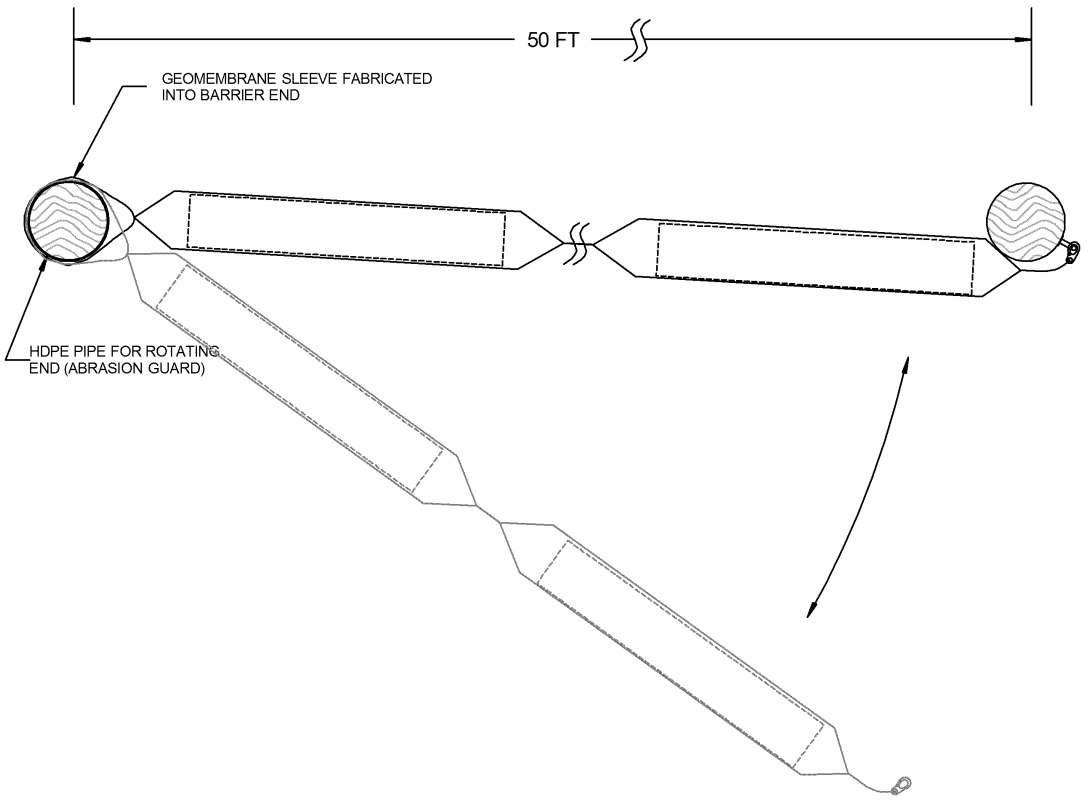
Figure 3 - Silt Curtain Anchoring Layout (Barge Outside)

PROPOSED SILT CURTAIN DETAIL



NOTE: ±50' ANCHOR SPACING (TO BE ADJUSTED AS FIELD CONDITIONS REQUIRE)

Figure 4 - Typical Silt Curtain System Cross-Section



TOP VIEW
UPPER GATE OPENING
N.T.S.

Figure 5 - Silt Curtain Gate Details

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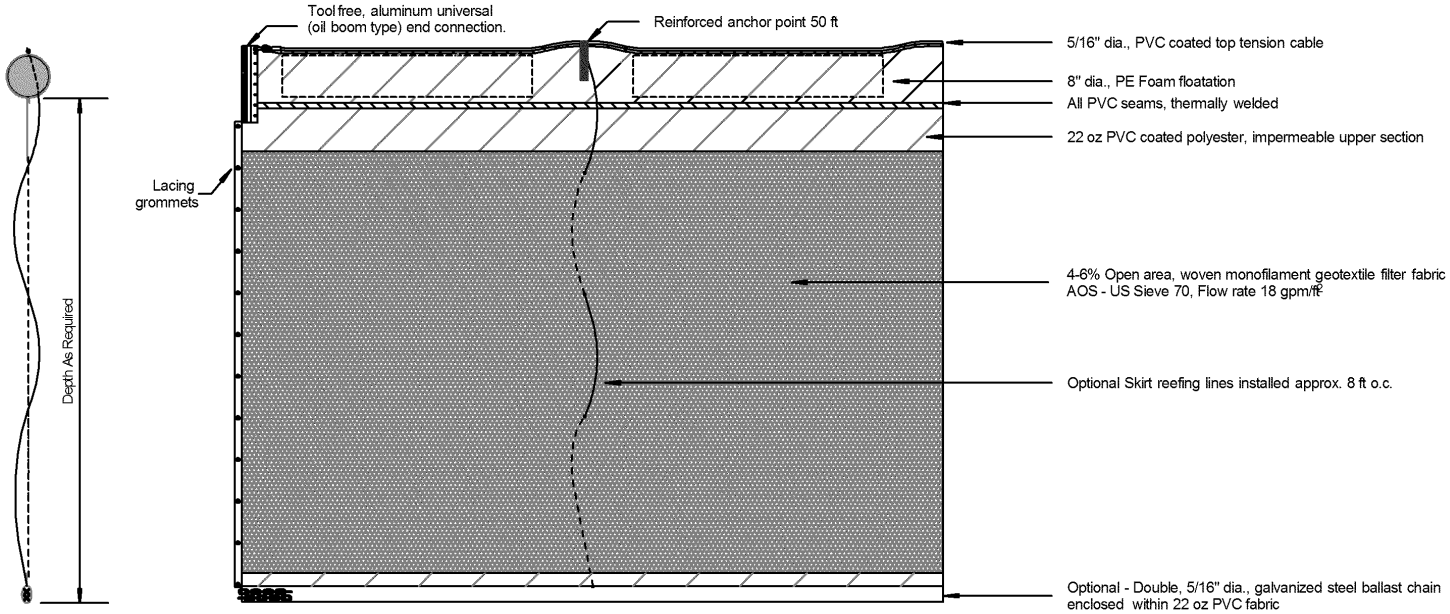
PROJECT:
Passaic River, RM 10.9 Remediation
Lyndhurst, NJ

DATE: 05/07/2013	DRAWN BY: TJP
SCALE: N.T.S.	REVIEWED BY:
DRAWING NO.: 02	



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PROJECT: Terra-Sea Environmental Solutions Passiac River - RM 10.9 Project	
LOCATION: Lyndhurst, NJ	
SHEET NO.: 1 of 1	DATE: 01-25-2013
SCALE: Not To Scale	DRAWN BY: TJP

Figure 6 - Type II Silt Curtain Details